
Slovakia in the Euro Area – Costs and Benefits

Submitted 11/01/23, 1st revision 25/01/23, 2nd revision 20/02/23, accepted 08/03/23

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Abstract:

Purpose: Examine Slovakia's path to the euro area, the related costs and benefits, and possible implications for Poland.

Design/Methodology/Approach: A critical review of literature on optimum currency areas and costs and benefits of joining a monetary union. Statistical analysis and econometric modelling are applied as well. An econometric model is constructed and estimated with the least-squares method (LSM). The results of the model estimation are analysed.

Findings: The analysis of the model estimation results suggests joining the euro area has had a significant positive effect on economic growth in Slovakia. The EUR variable has a statistically significant and quite considerable impact on GDP fluctuations in Slovakia in the period studied. The following conclusions can be posited, therefore: joining a monetary union is greatly recommended to such a small, highly open economy with an uncompetitive currency, although Slovakia joined the full Economic and Monetary Union at an unfortunate time of a financial and fiscal crisis. The pandemic crisis also had some adverse effect on the cost-benefit relation of the euro area membership. It seems, however, Slovakia has managed to gain some measurable positive effects of its joining the euro area and the benefits can be seen as outweighing the costs.

Practical Implications: The results may serve to analyse costs and benefits of a small, open economy joining an economic and currency union and to choose an appropriate moment for such an operation. The study can be of use to researchers and political decision-makers.

Originality/Value: The paper raises an original problem of a small, open economy and its path to the membership of a currency union. It's a contribution to the theory of economic and monetary unions which identifies the costs and benefits of joining a currency union using the example of Slovakia.

Keywords: Currency union, EMU, integration, cost-benefits, financial crisis.

JEL codes: F33, F36, F41, F45.

Paper type: Research article.

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1. Introduction

The aim of the research that has produced this article is to answer the following questions:

- What was Slovakia's path to the euro area (reforms, favourable factors and barriers, the fulfilment of convergence criteria)?
- What effect did joining a full monetary union at the time of a financial and fiscal crisis in the euro area have on the cost-benefit relationship?
- What was the degree of Slovakia's trade and financial integration into the euro area?
- What conclusions for Poland could be drawn from the Slovakian experience, considering the different sizes of both the economies?

This is our research hypothesis: Slovakia's joining the full Economic and Monetary Union took place at a relatively difficult time (2009 – the financial and fiscal crisis), however, failing to adopt the common currency would have caused a lower economic growth due to external factors, internal economic policy, and the pandemic crisis.

A critical literature review, statistical and econometric methods are applied in this study. The statistics and analysis relate to 1999-2021.

2. The Costs and Benefits of a Country Joining the Euro Area

A monetary union, a uniform currency area with a common currency and a common monetary policy conducted by a supranational central bank, may be a source of substantial benefits to its member countries. These benefits arise from the disappearance of currency exchange costs and of the exchange rate risk in economic relations between union members, from a stabilisation of prices and employment, and the growth of real GDP (Grubel, 1970, 318-324; Krugman and Obstfeld, 2000, 622-630; De Grauwe, 2003, 15-32; Bukowski, 2003, 65-66).

On the other hand, countries forming a monetary union resign from their own monetary (including rate of exchange) policies as the instruments of macroeconomic stabilisation. Thus, restoring economic equilibrium in case of shocks can be based on the market adjustment mechanism and, to some extent, on the benefits from fiscal policies. The latter is an ineffective and 'blunt' tool of macroeconomic stabilisation, though, and additionally leads to higher budget deficits, public debt, and interest rates in the medium and long terms (Bukowski, 2003, 61-62; Mortimer-Lee, 2001, Krugman, 1999, 201-202).

The theory of optimum currency areas designates some criteria to be met by the economies of monetary union members. The fulfilment of these criteria is seen as necessary to assure an efficient operation of adjustment mechanisms restoring economic equilibrium in individual countries and a whole currency union.

These criteria include: a high mobility of labour and capital, both geographically and across sectors, an openness of economies, diversified production, a flexibility of markets, prices, and ages (Mundell, 1961; McKinnon, 1963; Kenen, 1970; De Grauwe, 1997, 7 -10; Buiters, 1995, 30-31). It is in addition stressed and argued the members of a monetary union should exhibit similar economic development and mechanisms of economic operation, that is, similar GDP per capita and the rates of economic growth, similar rates of inflation, budget deficits, public debt in relation to GDP, and similar legal systems (Grubel, 1977, 452; Wood, 1973; Magnifico, 1971). The degree of economic integration and similarities and even synchronicity of business cycles are emphasised as well (Krugman and Obstfeld, 2000, 622-630; Frankel and Rose, 1997).

The conclusion can be postulated on the basis of the theory of optimum currency areas that countries between which there are considerable differences of economic development and economic mechanisms should undergo a process of real convergence before forming a monetary union defined as a uniform area with a common currency and monetary policy managed by a supranational central bank. The real convergence is treated here as a process of in-depth structural and institutional changes leading to integrating economies approaching one another in terms of economic development and mechanisms, business cycles, and the process of approximating the criteria of an optimum currency area.

A different view is advanced by Frankel and Rose (1997), who have formulated the hypothesis of endogenous criteria of optimum currency area. They claim historical data do not predetermine whether a country is a good candidate for a monetary union. The hypothesis says the formation of a common currency area provides conditions for a more intensive intrasectoral trade, which is a factor conducive to the synchronicity of business cycles. A high degree of trade integration (first of all, the development of intrasectoral trade) in countries with relatively well-timed business cycles should lead to a transformation of idiosyncratic economic shocks (i.e., those specific to a given economy) into an economic cycle coordinated on an international scale.

The literature identifies the following factors determining the relationship between benefits and costs (stabilisation losses) associated with joining and participation in a monetary union with a common currency and monetary policy (De Grauwe, 1997, 5-19, 69-86; Krugman, 2000, 625-627):

- The degree of flexibility of the job market including wages (the greater it is, the lower the costs),
- The degree of labour and capital mobility (the greater it is, the lower the losses),
- The degree of economy openness (the greater it is, the lower the losses),
- The degree of production and economy diversification (the greater it is, the lower the losses),

- The international competitiveness (long-term competitive capacity) of an economy,
- The degree of integration between a given economy and the economies of a currency area.

In the latter case, it is important to what extent the economy of a given country is incorporated into a common market of products and labour and the financial market.

It seems that even if the hypothesis of endogenous criteria of optimum currency area is accepted, the process of real convergence is necessary if a monetary union is to be formed by countries at different levels of economic development. In addition, profound structural and institutional changes are necessary where the economies of such countries have relatively rigid markets, prices, and wages, a relatively high rate of inflation, high budget deficits and public debts, since the burden of adjustments in case of economic shocks within a monetary union in its individual member states (asymmetric shocks) rests chiefly on the market mechanism.

There is a connection between a continued fulfilment of the nominal convergence criteria, as mentioned in the introduction, and a real convergence. The processes of the latter should lead to a macroeconomic stabilisation and a permanent fulfilment of nominal convergence criteria.

From the perspective of the classical theory of optimum currency areas, the real convergence is essential. From the viewpoint of the hypothesis of endogenous criteria of optimum currency area, the degree of synchronicity of business cycles is of the essence.

The benefits of joining the euro area comprise: a reduced rate of exchange risk and transaction costs, lower bank charges on businesses and households, a reduced uncertainty of pricing developments, lower macroeconomic risk, diversified risk within integrated financial markets (important to the smoothing of business cycles and the stability of financial system), growing foreign trade, higher investments and GDP.

In turn, expected costs include: those connected to speculative attacks on a currency during the two years of stabilisation in the European Exchange Rate Mechanism II, to currency conversion to the euro, to the risk of losing the international competitiveness of candidate countries as their exchange rates are revalued, and the costs of macroeconomic stabilisation following on asymmetrical shocks.

It needs to be stressed the continuing benefits of an economic and monetary union accumulate in the medium and long terms, whereas the costs, in the short term. It must be underlined, however, the scale of benefits and their relation to costs depend on macroeconomic policies both prior to joining and during the membership of a monetary union.

Macroeconomic policies at the time of preparations should focus on reforms designed to provide conditions for a flexible operation of markets, including the labour market, fiscal stabilisation, stimulation of enterprise and competitiveness. These should also be bolstered with the privatisation of any remaining state enterprises, banks, and insurance companies.

3. The Costs and Benefits of Joining the Euro Area in the Conditions of a Financial and Fiscal Crisis

The business cycles of growth and recession are natural phenomena in the market economy, as natural as sea tides or moon phases. Recession is a natural mechanism of cleansing the economy of ineffective business organisations and restoring the equilibrium disturbed at a time of economic growth.

Observations of the cycle and research results suggest business fluctuations cannot be reduced to a single, traditionally understood set of phenomena like the fluctuations of production, employment, and investment. They should be treated as a whole set of interacting effects (Barczyk *et al.*, 2006, 15). The rising phase of the business cycle (economic recovery and growth) is characterised by a self-perpetuating mechanism including a relief of financial restrictions, rising asset prices, currency appreciation, more effective microeconomic management, and growing rates of profit.

These processes are normally associated with a rising rate of inflation. Before the peak of the rising phase, some barriers begin to come up, like the deficits of production factors, which leads to growing prices and production costs, falling rates of profit from capital, and the emergence of financial restrictions. Production, employment, and management effectiveness decline, microeconomic losses are generated, asset prices reduce, and currency depreciates in the declining phase.

Such changes are natural parts of the business cycle. In some cases, however, they can be unnaturally reinforced in comparison to the usual cycle (Minsky, 1992, 14-15). These cases can involve demand or supply, monetary, currency, fiscal or other economic shocks (Thalassinos and Thalassinos, 2018).

Economic shocks denote unforeseeable economic and/ or political developments that stimulate economic growth (positive) or cause recessions (negative). They may lead to an economic recovery earlier than in the expected normal cycle, an abrupt early interruption of prosperity and recession, a rate of economic growth higher than in line with the trend and a longer rising phase or to a deeper and longer recession.

Financial shocks where the financial system in an economy is liberalised and easily adapts to the fluctuations of economic activity are a special case. In such a system, the tendency to take risk in search of higher returns on capital is an important factor

stimulating changes in the economy. This particular aspect is reflected in a number of theoretical concepts including H.P. Minsky's financial instability hypothesis.

Minsky (1992, 4-5) pointed to an increasing fragility of a financial system before the top point of the cycle. He also claimed the periods of growth in a market economy are followed by the formation of financial structures liable to deflation, a decline of asset values, and profound depression. The problem is, though, the levels and structure of liability repayments are clearly specified, whereas revenues are subject to cycle fluctuations.

The fragility of a financial system is also demonstrated by the fact some apparently minor disturbances may lead to an abrupt economic collapse.

Expansive economic, fiscal and monetary policies that generate speculative bubbles, especially in the property market, are a factor bolstering negative trends. On the other hand, more stringent monetary policies causing a speculative bubble to burst usually lead to sudden collapses of prosperity. This can be assumed to have taken place in the American economy, for instance, when the Fed raised interest rates in 2004-2006.

A recession would have occurred in 2007-2009 one way or another, as a result of the logic of the business cycle. Its depth, however, was determined by the large scale of the financial crisis. The latter's causes should be sought in the nature of the system and of the financial mechanism in the market economy. Its scale was a result of the following reasons:

- An expansive monetary policy of the US government,
- More stringent monetary policies that consisted in the Fed raising interest rates on federal funds in the United States in July 2004-July 2006,
- The development and widespread use (ABS, CDO, etc.) of financial engineering combined with weak risk assessments by rating agencies,
- The state giving an impression of soft restrictions on enterprises and the resultant growth of enterprise expectations,
- A detachment of corporate management from owner supervision and the associated pursuit of high rates of return at the cost of high risk.

Countries with the high shares of rigid spending in budget expenditure and high public debt in relation to GDP which roll the public debt are particularly prone to the crises of public finances and continuing recessions. Financial markets' responses to any signals of macroeconomic risk of a country in connection with rising budget deficit and debt are violent.

A growing public debt in relation to GDP caused by a rising budget deficit generates a high risk of investment in treasury bonds and difficulties with placing new issues

in the market. This also denotes a greater bond profitability in the financial market and problems obtaining capital to service and repay debt by its due dates falling in a given year.

Increasingly higher rates of interest become necessary to encourage investors to buy the bonds due to the growing investment and macroeconomic risks in the country. This in turn raises public debt and brings more difficulties with debt repayment, the need for more bond issues and, if they cannot be placed in the market, to insolvency.

This is accompanied with the contagion effect: reduced ratings for more countries exhibiting the high relations of debt and deficit to GDP, the increasing costs of debt servicing and problems with placement of new issues necessary to draw capital to repay debt.

The case of Greece is telling in this context. It shows the way the response of financial markets to a rising macroeconomic risk leads to a profound financial crisis and the government's inability to meet its public debt obligations.

Portugal, Spain, Ireland, and Italy in 2008-2010 are some instances of the contagion effect and the fiscal and financial crisis spreading to subsequent countries.

The experience of these euro area countries indicates the absence of fiscal stability, an excessive share of rigid spending in budget expenditure, high budget deficits and public debt in relation to GDP lead to deep negative economic shocks that increase the risk of insolvency, reduce competitiveness and GDP, and boost unemployment.

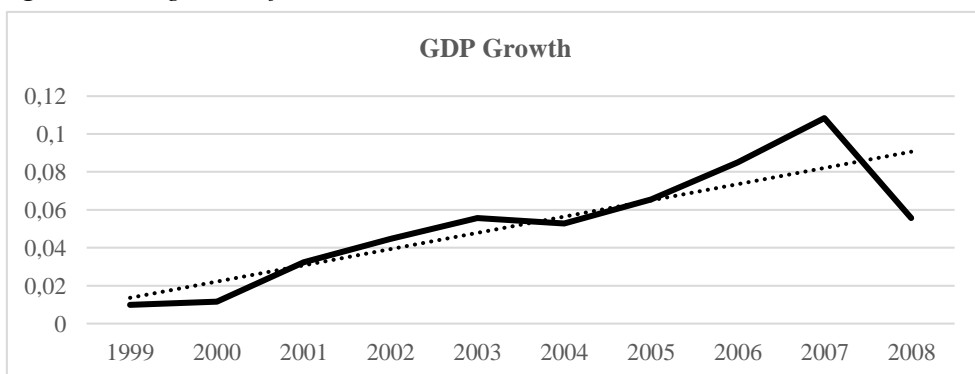
A resignation from a monetary policy and own currency is particularly dangerous to countries with a lower international competitiveness of economy and unstable macroeconomic policies, exemplified by Greece.

A restoration of economic equilibrium and an improved competitiveness in foreign trade require either a depreciation mechanism at a fluid rate of exchange (a devaluation at a fixed rate) of a domestic currency and an adequate monetary policy or, such instruments lacking, some price and wage adjustments. It's impossible where product and job markets are not very flexible (Bukowski, 2011).

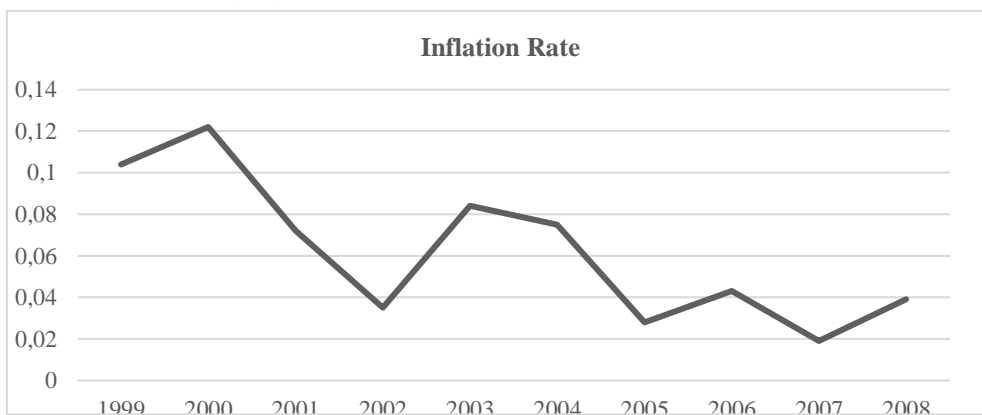
4. The Economic Situation of Slovakia before Joining the Euro Area

The economic situation of Slovakia before joining the euro area (in 1999-2008) had been quite good. The GDP had grown on a regular basis up till 2007. Unfortunately, the inception of the financial and fiscal crisis was marked by a substantial decline of GDP growth in 2008 (Figure 1).

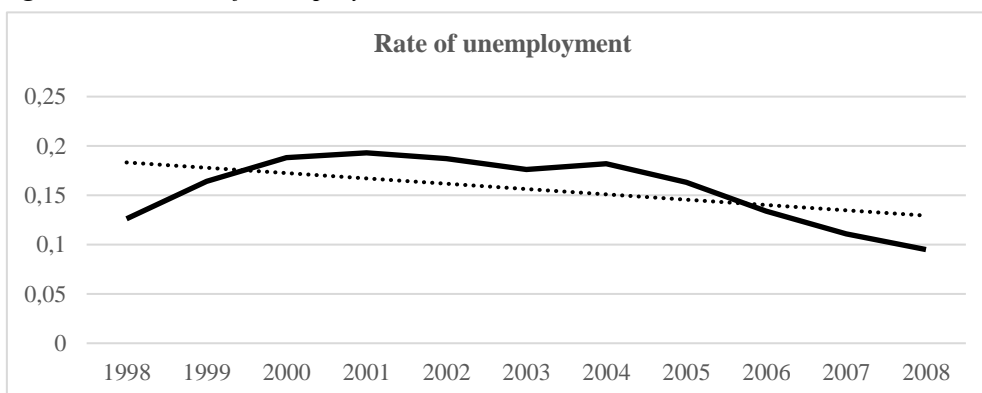
Inflation and unemployment fell significantly (Figures 2 and 3) and the fluctuations of the current account balance decreased as well at the same time (Figure 4).

Figure 1. The growth of real Slovakian GDP in 1999-2008.

Source: AMECO online.

Figure 1. The rate of inflation Y to Y in 1999-2008.

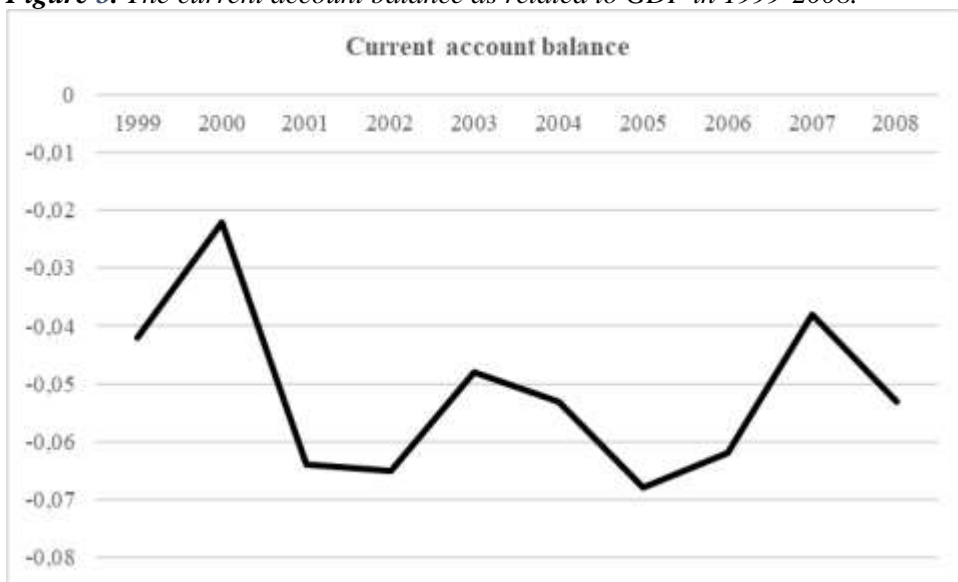
Source: AMECO online.

Figure 2. The rate of unemployment in 1999-2008.

Source: AMECO online.

The current account balance in relation to GDP was negative in the period studied to improve in 2000, deteriorate in 2001, and improve in the following years. In 2008, the current account balance reached -0.053.

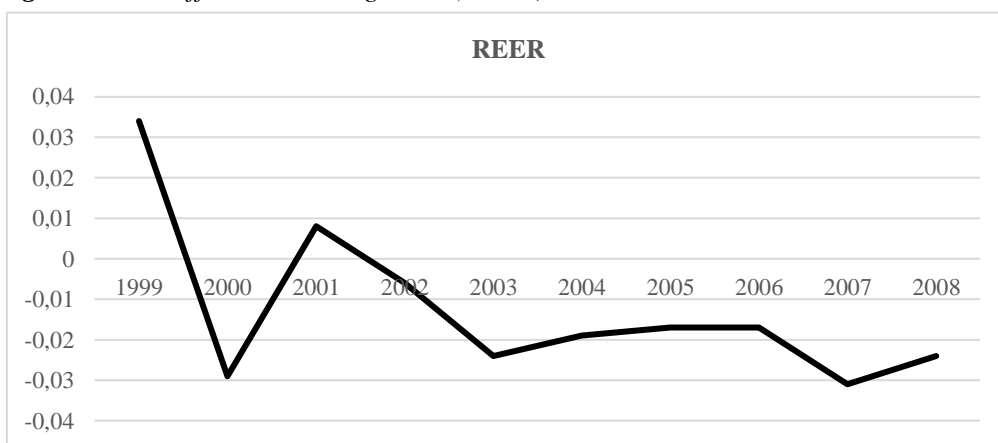
Figure 3. The current account balance as related to GDP in 1999-2008.



Source: AMECO online.

Those certainly had some impact on the variations of real effective exchange rate. The stabilisation of the currency rate in 2007-2008 as part of ERM 2 brought a reduction of the real exchange rate (Figure 5).

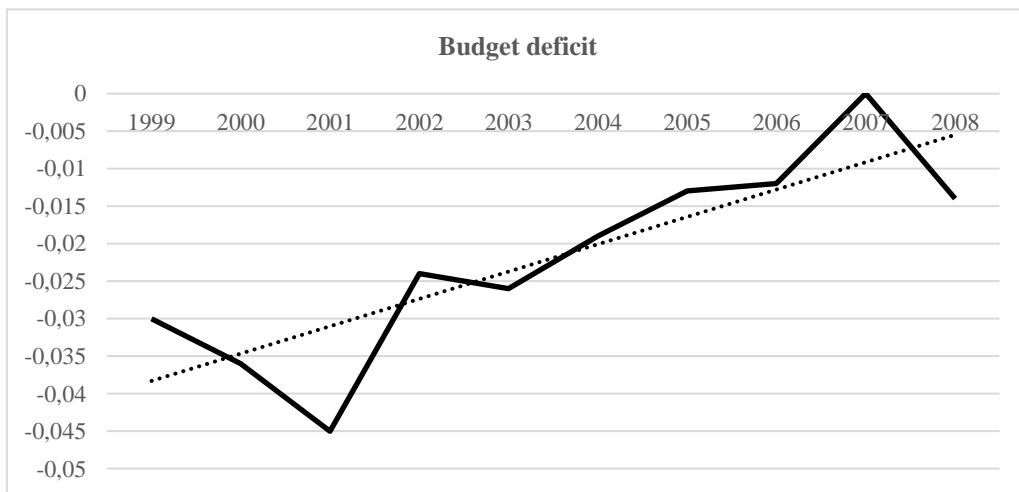
Figure 5. Real effective exchange rate (REER) in 1999-2008



Source: AMECO online.

The budget deficit and public debt also declined markedly in 1999-2008 (Figures 6 and 7), although it should be pointed out the public debt relative to GDP in Slovakia has always been lower than in the eurozone countries.

Figure 4. The consolidated balance of public finance (budget deficit / budget surplus) to GDP in 1999-2008

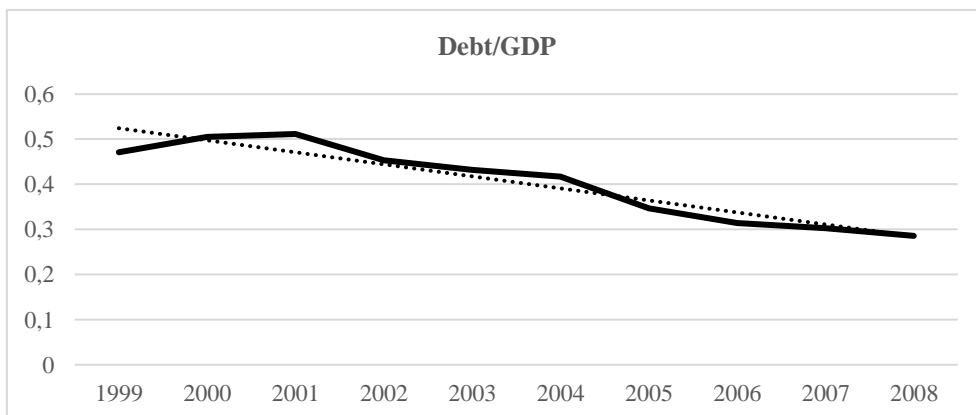


Source: AMECO online.

5. The Path to the Fulfilment of the Convergence Conditions

The reform programme of PM M. Dzierinda's government (1998-2006) played a very large, perhaps even decisive role in preparing Slovakia to enter the euro area. They enhanced the flexibility of the job market, which cut unemployment and tax burden on households and businesses. The reforms of the national insurance and judicial systems (adjustment to the EU's legal standards) improved the attractiveness of the Slovakian economy to foreign investors as well. All of that provided the conditions for a quite rapid rise of the GDP. The successive, left-wing Slovakian government upheld the drive to join the euro area by adapting the economy to the fulfilment of convergence conditions. Above all else, the public finances were consolidated.

The degree of trade integration into the euro area countries was satisfactory at the time the single currency was adopted (more than 60% of Slovakia's trade turnover was with the euro countries). It needs to be stressed the degree of the Slovakian financial markets' integration into the euro area financial markets was relatively modest (Bukowski 2020, 128-132; Bukowski 2013a; 2013b; 2013c). This did not prevent benefits, however. The degree of the business cycle synchronicity with the euro area countries (the aggregated cycle) was 0.45 in 1999-2008 (Rinaldi-Larribe *et al.*, 2009).

Figure 5. Public debt to GDP in 1999-2008.

Source: AMECO online.

6. Accession to the Euro Area – Initial Effects

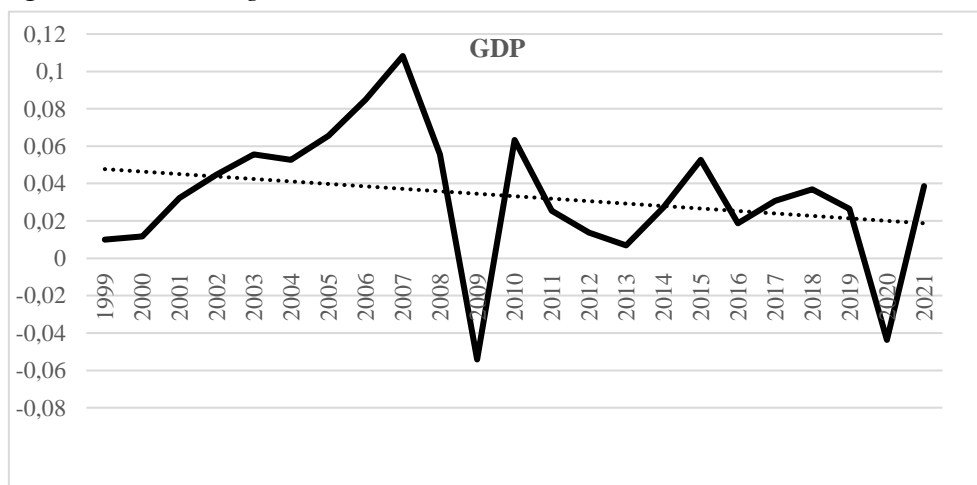
Slovakia joined the euro area at an unfortunate time, since the financial and fiscal crisis began in the area in 2008. This small, highly open economy became particularly exposed to the consequences of the falling foreign demand. Nevertheless, the rates of inflation, exchange, and unemployment reduced, the consolidated balance of the public finance and of the current account improved after 1 January 2009, while GDP increased by 28% in 2009-2021.

Any comparisons with the GDP growth out of the euro area at the time make no sense as economic growth is a result of a range of factors, both superficial and profound. Joining the euro by itself offers opportunities, and these are the profound factors of economic growth.

7. An Analysis of Slovakia's Macroeconomic Ratios Before and After Joining the Euro Area

As far as the Slovakian indicators of economic growth and global demand (Figures 8 and 9) are concerned, their development is similar. This suggests a strong dependence of the Slovakian economy on the condition of global economy and demand, on the one hand, and its high openness, on the other hand. GDP had risen steadily until 2007.

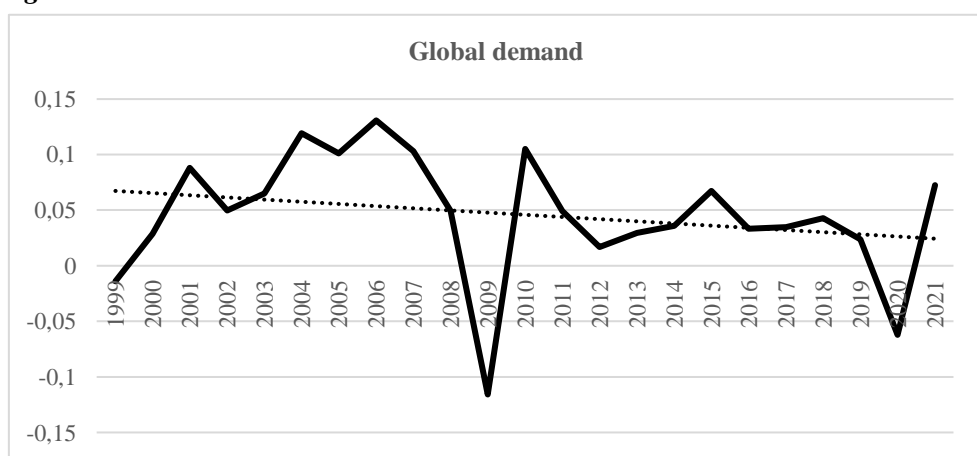
During the financial crisis of 2007-2009 and the debt crisis of 2011-2013, the Slovakian GDP grew more slowly, or even shrank in 2008 and 2020. The latter date shows Slovakia, like most countries, was not left untouched by the pandemic crisis. The time after 2009, that is, the introduction of euro, displayed some relatively minor fluctuations of both the GDP growth and global demand.

Figure 6. Real GDP growth in 1999-2021.

Source: AMECO Online.

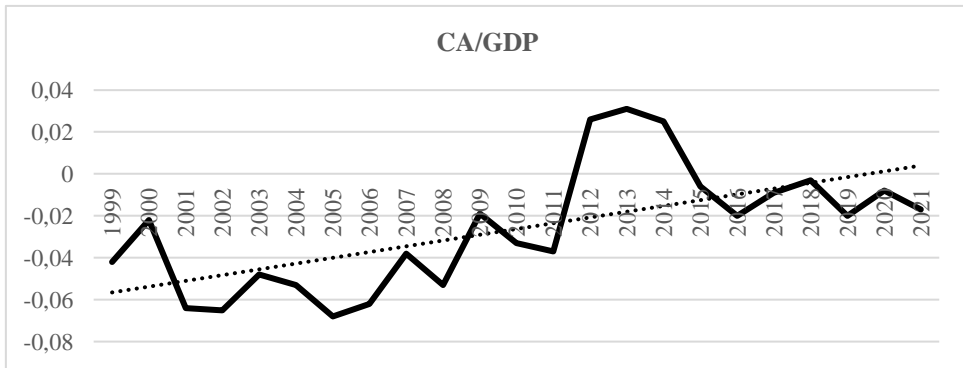
A rising trend in the entire period examined can be noted in the current balance account. It experienced some times of growth and decline, too. Initially, the balance was negative and ranged from -0.02 to -0.07. In 2011–2015, it was positive for Slovakia, to vary within the range of 0-0.02 in the following years. The adoption of euro undoubtedly contributed to its stabilisation.

The real effective exchange rate experienced considerable variations before the euro, which reduced as the ERM 2 was applied. The Slovakian real effective exchange rate stabilised after two years.

Figure 7. Global demand in 1999-2021.

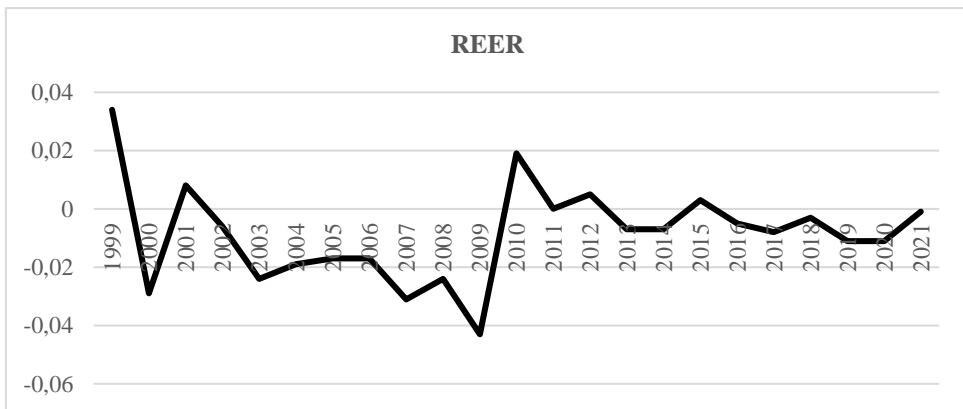
Source: AMECO Online.

Figure 8. The current account balance as related to GDP in 1999-2021



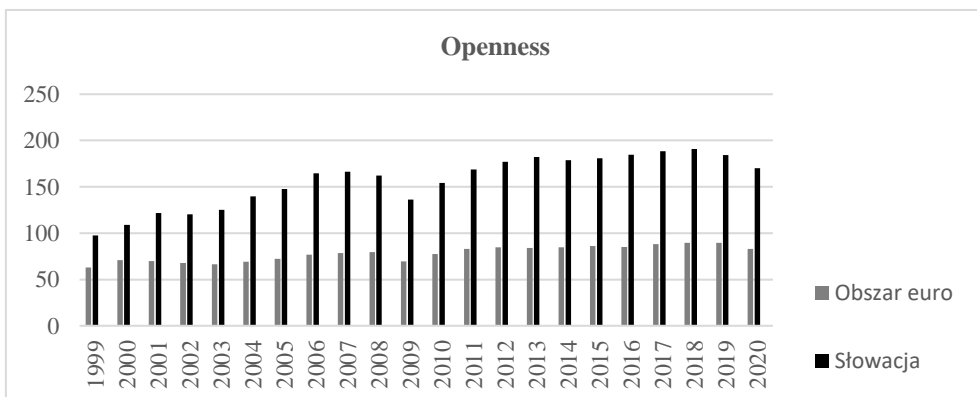
Source: AMECO Online.

Figure 9. Real effective exchange rate in 1999-2021

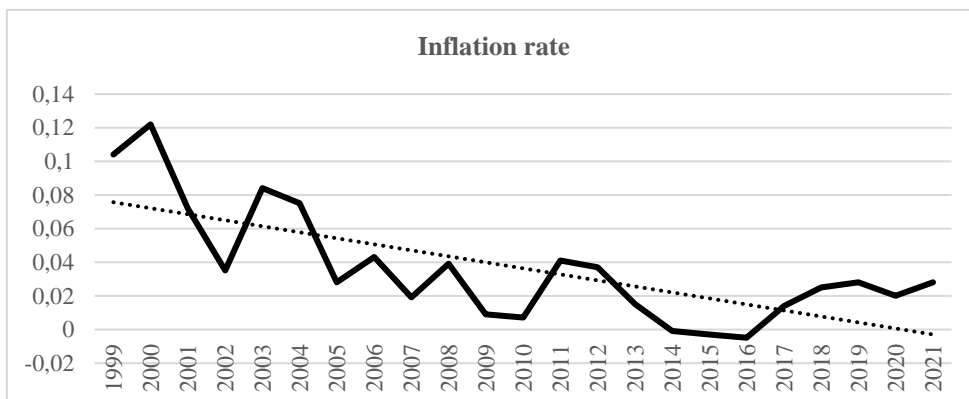


Source: AMECO Online.

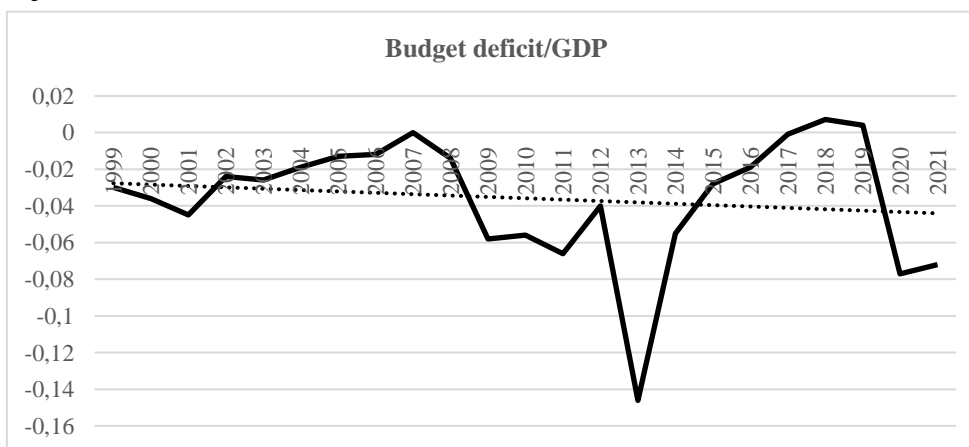
Figure 10. The Slovakian economy's openness in 1999-2020



Source: AMECO Online.

Figure 11. The rate of inflation in Slovakia in 1999-2021 (Y to Y)

Source: AMECO Online.

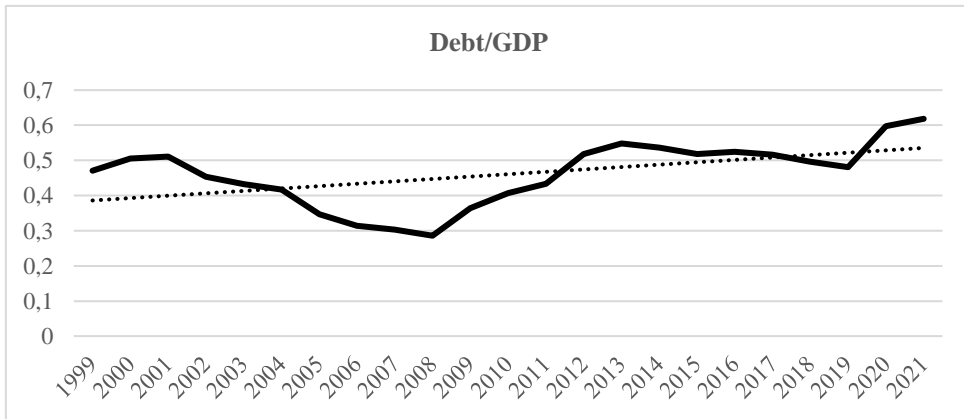
Figure 12. The consolidated balance of public finance (budget deficit / budget surplus) to GDP in 1999-2021

Source: AMECO Online.

The openness of the Slovakian economy was above the eurozone average during the whole time considered. It tended to increase between 2009 and 2013, to stabilise and then decline a little at the time of the pandemic.

The rate of inflation tended to reduce in the entire period studied. It exhibited some fluctuations after 2009, peaking a little above 4%.

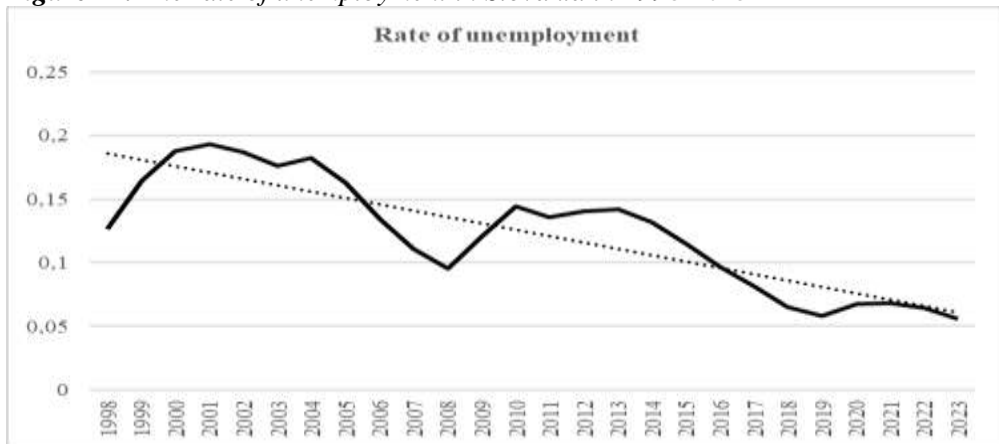
The budget deficit had been below 7% until 2013. 2013 was the exception, when the Slovakian budget deficit exceeded 14%, however, the Slovakian government managed to stabilise its spending policy in the subsequent years, generating a surplus in 2016. It had been maintained right until the pandemic crisis.

Figure 13. The debt /GDP ratio in Slovakia in 1999-2021

Source: AMECO Online.

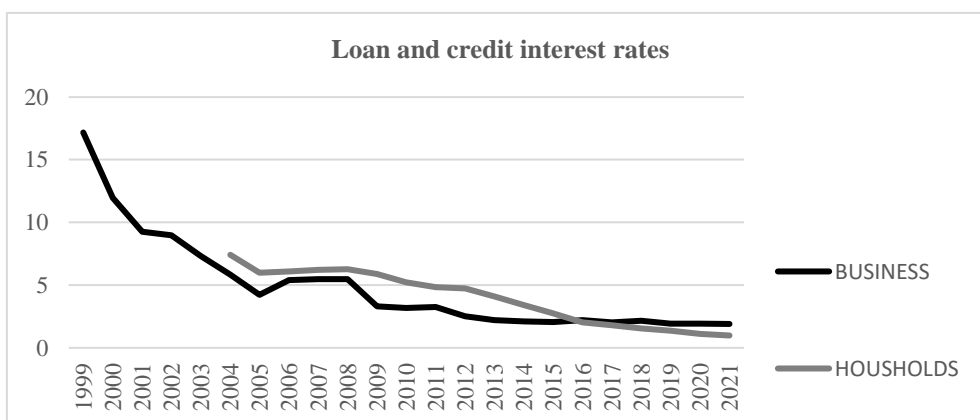
The debt ratio was relatively low compared to eurozone countries during the time analysed. It has exhibited a rising tendency, though. The debt climbed in 2008, certainly in connection with the worldwide financial crisis. It continued to grow until 2013, to shrink steadily in the following years. The debt rocketed in 2019 and has kept rising. This must be attributed to the pandemic crisis. The Slovakian rate of unemployment has tended to fall, with some fluctuations during crises. It has ranged around 6% since 2019.

The rates of loan and credit interest has clearly tended to shrink. It was below 2% in 2021 for both enterprises and households. The interest rates for business declined dramatically, from over 17% to 4%, in 1999-2005, to rise a little afterwards. A steady declining trend can be noted since 2008, with loans and credits interest rates stabilising around 2%. This is due first of all to the adoption of euro by Slovakia.

Figure 14. The rate of unemployment in Slovakia in 1998-2023

Source: AMECO Online.

Figure 15. The rates of loan and credit interest for businesses and households in Slovakia in 1999-2021



Source: AMECO Online.

8. Benefits of Joining the Euro Area – The Model Approach

8.1 Data and Model

The study employs the data from the following bases: OECD, AMECO online, and EUROSTAT. A model is constructed to estimate the effect of Slovakia joining the euro area on GDP growth.

$$\ln GDP_t = a_1 + a_2 CA_t + a_3 BD_t + a_4 PB_t + a_5 D_t + a_6 p_t + a_7 u_t + a_8 REER_t + a_9 EUR_t + e_t$$

where:

GDP_t - GDP in fixed prices,

CA_t - current account balance to GDP,

BD_t - consolidated balance of the public finance to GDP,

PB_t - public debt to GDP,

D_t - final demand,

P_t - rate of inflation (average annual rate of price changes),

U_t - rate of unemployment,

$REER_t$ - real effective exchange rate,

EUR_t - zero-one variable – monetary integration (1 in the years of full membership in the euro area, 0 – the years before joining the euro area).

8.2 The Results of Model Estimation

The results of Engle-Granger test suggest a co-integration of the time series utilised in the model (Table 1).

Table 1. Augmented Dickey-Fuller test for uhat (Engle-Granger)

Augmented Dickey-Fuller test for uhat, testing down from 1 lags, criterion AIC, sample size 21
unit-root null hypothesis: $a = 1$
test without constant
including one lag of $(1-L)uhat$
model: $(1-L)y = (a-1)*y(-1) + \dots + e$
estimated value of $(a - 1)$: -1.55558
test statistic: $\tau_c(9) = -5.66593$
p-value unknown
1st-order autocorrelation coeff. for e: -0.018

Source: The authors' own calculations using Gretl software.

Table 2 contains the results of model estimation. The tests (their results are given below Table 2) show the model is well constructed.

Table 2. OLS, using observations 1999-2021 ($T = 23$), Dependent variable: l_GDP , HAC standard errors, bandwidth 2 (Bartlett Kernel)

	Coefficient	Std. Error	t-ratio	p-value	
const	24.3313	0.144383	168.5	<0.0001	***
CA	0.968825	0.291327	3.326	0.0050	***
BD	-0.375977	0.189356	-1.986	0.0670	*
PB	-0.136367	0.0736386	-1.852	0.0853	*
D	0.963345	0.128336	7.506	<0.0001	***
p	-0.923438	0.269881	-3.422	0.0041	***
uu	-3.39753	0.268867	-12.64	<0.0001	***
REER	-0.932430	0.340796	-2.736	0.0161	**
EUR	0.195355	0.0328559	5.946	<0.0001	***
Mean dependent var	24.91173		S.D. dependent var	0.246815	
Sum squared resid	0.017627		S.E. of regression	0.035483	
R-squared	0.986847		Adjusted R-squared	0.979332	
F(8, 14)	442.3804		P-value(F)	1.75e-15	
Log-likelihood	49.86329		Akaike criterion	-81.72659	
Schwarz criterion	-71.50714		Hannan-Quinn	-79.15642	
rho	-0.015947		Durbin-Watson	1.975116	
White's test for heteroskedasticity –					
Null hypothesis: heteroskedasticity not present					
Test statistic: LM = 21.0885					
with p-value = $P(\text{Chi-square}(15) > 21.0885) = 0.134024$					
Test for ARCH of order 1 –					
Null hypothesis: no ARCH effect is present					
Test statistic: LM = 1.13462					
with p-value = $P(\text{Chi-square}(1) > 1.13462) = 0.286791$					
Test for normality of residual –					
Null hypothesis: error is normally distributed					
Test statistic: Chi-square(2) = 4.17637					
with p-value = 0.123912					

Test LM autocorrelation Null hypothesis: autocorrelation not present Test statistic: LMF = 0,00451862 With p value = $P(F(1, 13) > 0.00451862) = 0.947429$

Source: The authors' own calculations using Gretl software.

The results of model estimation indicate joining the euro area had a considerable positive impact on economic growth in Slovakia. The EUR variable has a statistically significant and quite substantial effect on GDP variability in Slovakia in the period studied.

9. Conclusion

The above analysis leads to the following conclusions:

- The Slovakian economy is an almost model highly open economy as described by literature and analysed from the viewpoint of a monetary union member state.
- Joining a monetary union by such a small, highly open economy with an uncompetitive currency is greatly recommended (as discussed by R. Mundell).
- Slovakia's accession to a full Economic and Monetary Union fell on an unfortunate time of a financial and fiscal crisis.
- The cost-benefit relation of the euro area membership was adversely affected by the pandemic crisis.

In general, Slovakia has derived some measurably positive effects of joining the euro area and it should be presumed benefits outweigh costs.

References:

- Alesina, A., Perotti, R. 1996. Fiscal Adjustment in OECD Countries: Composition and Macroeconomic Effects. NBER Working Paper No 5730, Cambridge.
- Barczyk, R., Kąsek, L., Lubiński, M., Marczewski, K. 2006. Nowe oblicza cyklu koniunkturalnego. PWE, Warszawa.
- Buiter, W.H. 1995. Macroeconomic Policy During a Transition to Monetary Union. Centre for Economic Policy Research, August, No 1222.
- Bukowski, S. 2013a. The Degree of the Polish and Slovak equity market integration with the euro area equity market. Quaderni Del Dipartimento Di Economia, Finanza e Statistica Quaderno n. 115 – Gennaio, Università degli Studi di Perugia (ISSN 1825-0211).
- Bukowski, S. 2003. Teoretyczne podstawy i realizacja unii monetarnej krajów członkowskich Wspólnot Europejskich. Szanse i zagrożenia dla Polski, Wydawnictwo Politechniki Radomskiej, Radom.
- Bukowski, S. 2011a. Economic and Monetary Union – Current Fiscal Disturbances and the Future. International Advances in Economic Research: An Official Publication of the International Atlantic Economic Society. Special Issue “The Greek Financial Crisis”, Guest Editor: Nicholas Apergis, Volume 17, Number 3, 274-287.
- Bukowski, S. 2011b. Międzynarodowa integracja rynków finansowych. Difin, Warszawa.

- Bukowski, S. 2013b. Analiza porównawcza stopnia integracji rynku akcji i obligacji skarbowych w Słowenii i Słowacji z rynkiem akcji i obligacji skarbowych w strefie euro. In: S. Lis, A. Prusek (red.), *Europa wobec wyzwań kryzysu finansowego. Dylematy polityki społeczno-ekonomicznej*, Uniwersytet Ekonomiczny w Krakowie, Kraków, 219-229.
- Bukowski, S. 2013c. Integracja rynków finansowych w Unii Europejskiej. Czechy, Polska, Słowacja, Słowenia, Węgry- strefa euro, Instytut Naukowo-Wydawniczy SPATIUM w Radomiu, Radom.
- Bukowski, S. 2020. *Financial Integration in the European Monetary Union*. Taylor & Francis, inprint Routledge, London - New York.
<https://doi.org/10.4324/9780429200496>.
- De Grauwe, P. 1997. *The Economics of Monetary Integration*, wyd. 3 uzup. Oxford University Press, Oxford.
- De Grauwe, P. 2003. *Unia walutowa*. PWE, Warszawa.
- Demertzis, M., Hallet, A.H., Rummel, O. 2000. Is the European Union a Natural Currency Area, or Is It Held Together by Policy Makers? *Weltwirtschaftliches Archiv. Review of World Economies*, Band 136, Heft 4.
- Easterly, W., Rebelo, S. 1993 *Fiscal Policy and Economic Growth: An Empirical Investigation*. NBER Working Paper, No 4499, Cambridge, October.
- Fidrmuc, J., Klein, C., Price, R., Wörgötter, A. 2013. Slovakia: A Catching Up Euro Area Member: In and Out of the Crisis. *IZA Policy Paper No. 55*, February.
- Frankel, J.A., Rose, A.K. 1997. The Endogeneity of the Optimum Currency Area Criteria. *CEPR, Discussion Paper Series*, No 1473.
- Gavazzi, F., Pagano, M. 1990. Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small European Countries. *NBER Working Paper No 3372*, Cambridge.
- Grubel, H.G. 1970. The Theory of Optimum Currency Areas. *Canadian Journal of Economics*, May.
- Grubel, H.G. 1977. *International Economics*. Homewood, Illinois.
- Kenen, P.B. 1970. The Theory of Optimum Currency Areas: an Eclectic View. In: R.A. Mundell, A.K. Swoboda (eds.). *Monetary problems of the International Economy*. Chicago University, Chicago.
- Krugman, P.R. 1999z. *Currencies and Crises*. The MIT Press Cambridge, London.
- Krugman, P.R., Obstfeld, M. 2000. *International Economics. Theory and Policy*, 5th edition. Addison – Wesley Publishing Company, Massachusetts.
- Magnifico, G. 1971. *European Monetary Unification for Balanced Growth: a New Approach*. Princeton University Press, Princeton.
- McKinnon, R.I. 1963. Optimum Currency Areas. *The American Economic Review*, Vol. 53, September.
- Minsky, H.P. 1992. The Financial Instability Hypothesis. The Jerome Levy Institute of Bard College Working Paper, No 74, Blithewood, May.
- Mortimer-Lee, P. 2001. Czy Euroland może funkcjonować przy jednej stopie procentowej? In: P. Temperton (ed.), *Euro. Wspólna waluta*, Feldberg, SJA, Warszawa.
- Mundell, R. 1961. A Theory of Optimum Currency Areas. *The American Economic Review*, Vol. 53, September.
- Raport o konwergencji. 2010. Europejski Bank Centralny, Maj.
- Rinaldi-Larribe, M.J., Safa A., Hilmi, N. 2009. Convergence between the business cycles of New European Member States and the Euro business cycle. *Topics in Middle Eastern and African Economies*, Vol. 11, September.

- Rzońca, A. 2007. Czy Keynes się pomylił? Skutki redukcji deficytu w Europie Środkowej. Wydawnictwo Scholar, Warszawa.
- Thalassinos, E., Thalassinos, Y. 2018. How to Avoid Financial Crises. In: Al-Sharhan S. et al. (eds) Challenges and Opportunities in the Digital Era. I3E 2018. Lecture Notes in Computer Science, vol 11195. Springer, Cham. https://doi.org/10.1007/978-3-030-02131-3_21.
- The National Bank of Poland's Report on full membership of the Republic of Poland in the third stage of the Economic and Monetary Union. NBP, Warszawa 2009.
- Wood, G.E. 1973. European Monetary Union and the U.K. - A Cost Benefit Analysis. Surrey Papers in Economics, No 3, September, University of Surrey, Guildford.